

REMARKS

Applicants thank the Examiner and the Examiner's supervisor for the courtesy extended to Applicants' attorney during the interview held April 1, 2004, in the above-identified application. During the interview, Applicants' attorney explained the presently-claimed invention and why it is patentable over the applied prior art. Applicants gratefully acknowledge the Examiner's indication that the below-rejection would be withdrawn upon formal response by Applicants. The formal response follows.

The rejection of Claims 1, 3, 5, 7, 9 and 11 under 35 U.S.C. § 103(a) as unpatentable over U.S. 4,963,505 (Fujii et al) in view of U.S. 4,712,152 (Iio), is respectfully traversed.

The present invention relates to a technique of suppressing so-called "auto doping" when performing an epitaxial growth of a semiconductor substrate.

As described in the specification under "Description of the Background Art," beginning at page 1, line 8, it has conventionally been proposed to form a thin epitaxial layer such as of silicon in a thickness of about several hundreds of nanometers on the surface of a semiconductor substrate such as a silicon substrate, but that impurities, such as boron, contained in the silicon substrate diffuses into the epitaxial layer during epitaxial growth or during a heat treatment, which phenomenon is known as auto doping.

One prior art technique for addressing the auto doping problem, as illustrated in Fig. 5 herein, involves forming an oxide film on the surface of a semiconductor substrate opposite the surface on which the epitaxial layer is to be formed. While this technique suppresses auto doping, it produces noticeable warpage in the resulting semiconductor substrate.

The present invention successfully addresses both the auto doping problem and the warpage problem discussed above.

Fujii et al discloses a semiconductor device and method of manufacturing same. In the inventive device of Fujii et al, it does not appear that any oxide layer therein extends

throughout a semiconductor substrate. The Examiner relies on Figure 8 therein, which represents prior art to Fujii et al and over which Fujii et al's invention is disclosed as an improvement. The Examiner appears to specifically rely on Fig. 8(b) of Fujii et al, which is the result of two oxide film coated substrates connected to each other, "in such a way that both oxide films are in direct contact with each other, by a direct connection method (column 2, lines 14-18).

The Examiner finds that Fujii et al "fail to disclose the required surface structure of the semiconductor substrate in the required configuration." The Examiner thus relies on Iio, which the Examiner finds disclose a semiconductor integrated circuit device "where the required surface configuration of the semiconductor substrate is disclosed."

The rejection is not understood. To the extent the Examiner relies on the structure in Fujii et al's Fig. 8(b), there is no oxide film therein but rather two separate substrates connected, resulting in two oxide films in indirect contact with each other. In other words, Fujii et al neither discloses nor suggests a single semiconductor substrate comprising an oxide film apart from first and second surfaces, as shown, for example, in Fig. 2 herein.

Iio discloses a semiconductor integrated circuit device comprising at least two NPN transistors whose bases and emitters are connected to the ground and whose collectors are connected to an input terminal; one of said NPN transistors having a lower breakdown starting voltage and a higher breakdown maintaining voltage than those of the other of said NPN transistors; and an input portion which has a breakdown maintaining voltage at a high surge voltage breakdown which occurs caused by an application of a high surge voltage input to said input terminal which is lower than that at a low input voltage breakdown which occurs caused by an application of an low surge voltage or an input voltage which rises up gradually (Abstract).

It is not clear why one skilled in the art would combine Fujii et al and Iio, but since neither reference discloses or suggests the presently-claimed substrate, it is not clear how the combination of these references would result in the claimed invention.

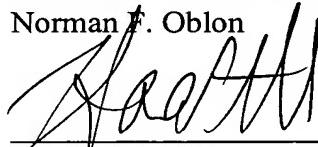
For all the above reasons, it is respectfully requested that the rejection over Fujii et al in view of Iio be withdrawn.

Applicants gratefully acknowledge the Examiner's indication of allowability of Claims 2, 4, 6, 8, 10 and 12. Nevertheless, Applicants respectfully submit that all of the presently-pending claims in this application are now in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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